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| 10/523,623 | 02/14/2006 | Alain Bergel | 355901-0109 | 5868 |

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| EXAMINER |
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ESSEX, STEPHAN J

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| ART UNIT | PAPER NUMBER |
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4111

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03/17/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/523,623 | Applicant(s) BERGEL ET AL. | |
| | Examiner STEPHAN ESSEX | Art Unit 4111 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02/04/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☒ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/27/2006</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 7-10, 12, 15, 16 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Armstrong (WO 2003/019705A2).

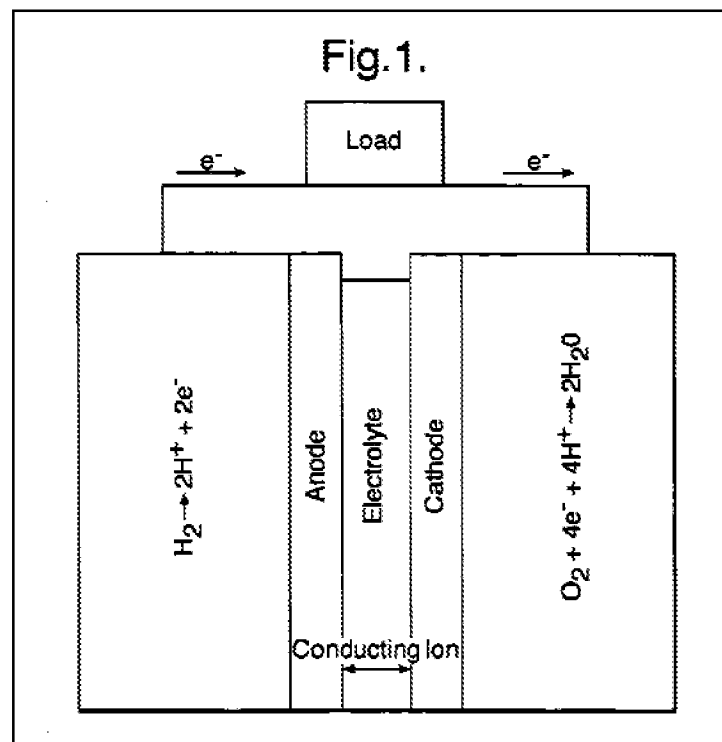
Regarding claims 1 and 18, Armstrong teaches a process for the treatment of at least one electrode of a fuel cell, before said cell is operated consisting in forming a biofilm on at least part of the surface of the said electrode (see pg. 11, lines 6-10), by immersing the said electrode in a medium capable of causing the growth of biofilms (see pg. 11, lines 17-20), the said biofilm being intended to catalyse the reaction at the electrode (see pg. 8, lines 16-25) and consisting simultaneously in subjecting the said electrode to a polarization potential (see pg. 11, lines 20-25).

Regarding claim 2, Armstrong teaches that the medium capable of causing the growth of the biofilms is water derived from a culture medium (see pg. 9, lines 1-4 and pg. 11, lines 17-19).

Regarding claims 7 and 8, Armstrong teaches a fuel cell comprising at least one cell having an anode compartment supplied with a reducing agent, the said compartment including an anode, and the said cell having a cathode compartment

Art Unit: 4111

supplied with an oxidizing agent, the said compartment including a cathode, the said compartments being placed on either side of the membrane (see pg. 1, lines 6-12 and pg. 6, lines 2-7), characterized in that at least one of the electrodes, prior to operation of the cell, is coated on at least part of its surface with a biofilm intended to catalyze the reaction at the electrode (see pg. 3, lines 7-10) (see figure 1).



Regarding claims 9 and 10, Armstrong teaches that the anode and cathode compartments are filled with water (see pg. 8, lines 9-15 and pg. 10, lines 19-21) capable of regenerating the biofilm (see pg. 10, lines 21-23), in which the anode and a cathode are respectively immersed and into which, in the respective compartments, a stream of oxidizing agent and a stream of reducing agent are sparged (see pg. 7, lines 7-10 and 25-28).

Art Unit: 4111

Regarding claim 12, Armstrong teaches that the oxidizing agent and the reducing agent feed their respective compartments directly in the form of a gas stream (see pg. 7, lines 7-10 and 25-28).

Regarding claim 15, Armstrong teaches that the electrode is formed from stainless steel (see pg. 7, line 30).

Regarding claim 16, Armstrong teaches that the oxidizing agent is oxygen and the reducing agent is hydrogen (see pg. 7, line 12).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Armstrong (WO 2003/019705A2) as applied to claims 1, 2, 7-10, 12, 15, 16 and 18

Art Unit: 4111

above, and further in view of Hasvold et al., "Sea-water battery for subsea control systems", Journal of Power Sources, 65, pages 253-261, 1997 [5] (hereinafter "Hasvold").

Regarding claim 3, Armstrong is silent to using seawater as a medium capable of causing the growth of biofilms.

Hasvold teaches that cathodes immersed in seawater are colonized by bacteria in the water, resulting in the formation of a catalyzing biofilm (see page 254, section 2.2. *Effects of marine life*). It would have been obvious to one of ordinary skill in the art to use seawater as a medium capable of causing the growth of biofilms because seawater is an abundant and freely available resource.

6. Claims 5, 6 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armstrong (WO 2003/019705A2) as applied to claims 1, 2, 7-10, 12, 15, 16 and 18 above.

Regarding claims 5 and 6, Armstrong teaches a process for the treatment of the cathode of a fuel cell, before said cell is operated, consisting in forming a biofilm on at least part of the surface of the electrode, by immersing the electrode in a medium capable of causing the growth of the biofilm, the biofilm being intended to catalyze the reaction at the cathode (see pg. 8, lines 9-15).

Armstrong does not explicitly teach subjecting the cathode to a polarization potential. However, Armstrong does teach subjecting the anode to a polarization potential ranging from -0.5 to 0.2 V vs. SHE (see pg. 11, lines 19-25). This potential

Art Unit: 4111

range is equal to -0.741 to -0.441 V vs. SCE. Given this range for an anode, one of ordinary skill in the art would reason to apply an equal and opposite polarization potential to a cathode (0.741 to 0.441 V vs. SCE). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have included a polarization step in the cathode treatment process of Armstrong as a means of controlling and monitoring the coating of the catalyst.

Regarding claim 17, Armstrong teaches an electrode coated on at least part of its surface with a biofilm.

Armstrong does not teach that this is done before the electrode is placed in the fuel cell. There are however, two predictable solutions regarding when to coat the electrode. It may be done either before or after the electrode is placed in the fuel cell. The Supreme Court has ruled that a claim can be proved obvious merely by showing that the combination of known elements was obvious to try. In this regard, the Supreme Court explained that, “[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has a good reason to pursue the known options within his or her technical grasp.” An obviousness determination is not the result of a rigid formula disassociated from the considerations of the facts of the case. Indeed, the common sense of those skilled in the art demonstrates why some combinations would have been obvious where others would not. Therefore, choosing from a finite number of identified, predictable solutions, with a reasonable expectation for success, is likely to be obvious to a person of ordinary skill in the art. See *KSR International Co. v. Teleflex Inc.*, 82

Art Unit: 4111

USPQ2d '385, 1395-97 (2007) (see MPEP § 2143, E.). Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have tried to coat the electrode before the electrode was placed in the fuel cell with a reasonable expectation that doing so would result in a successfully coated electrode.

7. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Armstrong as applied to claims 1, 2, 7-10, 12, 15, 16 and 18 above, and further in view of Chaix (U.S. Pat. No. 7,122,273).

Regarding claims 4 and 10, Armstrong is silent to the water being circulating water.

Chaix teaches a fuel cell with electrodes immersed in water, wherein the water is circulating water (col. 5, lines 4-9). It would have been obvious to one of ordinary skill in the art to modify the fuel cell of Armstrong with the circulating water of Chaix because the circulating water allows for effective cooling of the fuel cell (see Chaix, col. 4, lines 48-51).

8. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armstrong as applied to claims 1, 7-10, 12, 15, 16 and 18 above, and further in view of Yoshizawa et al. (hereinafter "Yoshizawa") (U.S. Pub. No. 2003/0162063A1).

Regarding claim 13, Armstrong does is silent to the gas stream or streams having moisture content such that it allows the biofilm to be regenerated.

Regarding claim 14, Armstrong does not teach a stream of water that coexists in

Art Unit: 4111

parallel with the gas streams feeding the compartment or compartments provided with a biofilm.

Yoshizawa teaches that is known in the art to humidify gas streams in a fuel cell using pure water (see paragraph 3). Water therefore necessarily coexists in parallel with the gas streams feeding the compartment provided with the biofilm. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the fuel cell of Armstrong with the humidification system of Yoshizawa in order to maintain moisture levels in the fuel cell and improve fuel cell efficiency.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHAN ESSEX whose telephone number is (571) 270-7866. The examiner can normally be reached on Monday - Friday, 7:30-5:00 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

Application/Control Number: 10/523,623

Page 9

Art Unit: 4111

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SJE

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795